

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 August 2001 (23.08.2001)

PCT

(10) International Publication Number  
**WO 01/60288 A1**

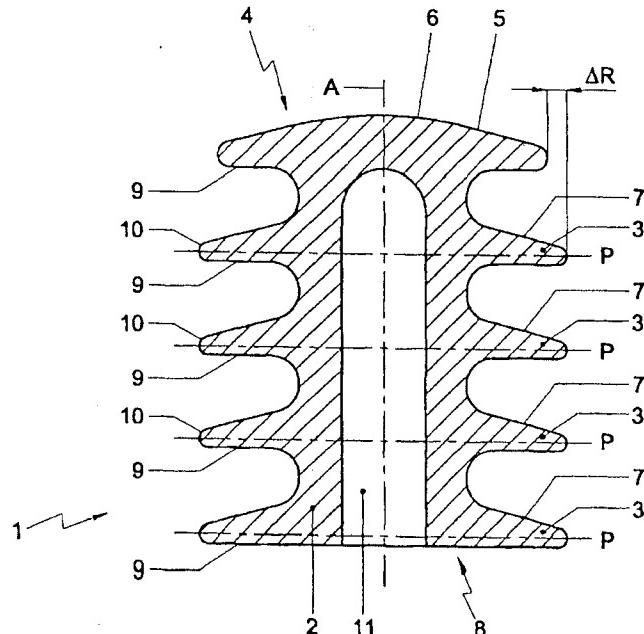
- (51) International Patent Classification<sup>7</sup>: A61F 2/30, A61L 31/06
- (21) International Application Number: PCT/NL01/00134
- (22) International Filing Date: 19 February 2001 (19.02.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
00200565.0 18 February 2000 (18.02.2000) EP  
00200566.8 18 February 2000 (18.02.2000) EP  
00203547.5 12 October 2000 (12.10.2000) EP
- (71) Applicant (for all designated States except US): ISOTIS N.V. [NL/NL]; Prof. Bronkhorstlaan 10, NL-3723 MB Bilthoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HESSELING,
- (52) Saret, Cornelis [NL/NL]; Spuisluis 36, NL-2408 PT Alphen a/d Rijn (NL). SPIERINGS, Petrus, Tarasius, Josephus [NL/NL]; Madocerastraat 24, NL-6524 LH Nijmegen (NL).
- (74) Agent: PRINS, A., W.; Vereenigde, Nieuwe Parklaan 97, NL-2587 BN The Hague (NL).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: PLUG FOR INSERTION INTO A BONE CANAL



**WO 01/60288 A1**





**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Title: Plug for insertion into a bone canal.

The invention relates to a plug for insertion in a bone canal.

Plugs for insertion into a bone canal are generally known and are used to restrict the flow of cement during prosthesis implantation.

In implant surgery and in particular for implantation of a hip 5 prosthesis, it is common practise to cement the prosthesis to the bone. In order to cement the prosthesis to the bone, the bone canal is broached or reamed, such that the trabecular, porous bone portions are removed and the remaining cortical, hard bone portions define the walls of the bone canal. An anchoring portion of the prosthesis is then inserted into the bone canal, for example an 10 anchoring portion of a hip prosthesis is inserted into a broached femoral bone, such that a ball portion of the prosthesis extends outward to replace the natural ball portion of the hip bone.

In order to fix the anchoring portion of the prosthesis to the bone, 15 cement, such as polymethylmethacrylate (PMMA) is inserted into the bone canal and is packed upon the prosthesis prior to insertion thereof. This cement then anchors the anchoring portion of the prosthesis to the bone material.

In order to provide for a secure joint between the prosthesis and the bone at the cement interface, it is desired to have the cement completely surround the prosthesis in the interstices between the prosthesis and the bone 20 material. However, the insertion forces and pressures exerted during insertion of the implant often drive the cement substance down into the intramedullary canal and away from the fixation area. This way, voids are formed in the cement mantle which later become stress points leading to early fatigue of the prosthesis and/or the fixation.

25 In order to restrict the flow of bone cement further into the intramedullary canal, intramedullary plugging devices or "plugs" have been developed which can be inserted into the bone canal as a blockage. Usually, the plug is provided with fins or other flange-like projections. These fins or flanges serve for simultaneous fixing of the plug in the bone canal by clamping

engagement of the walls and for blocking cement passage of the bone canal. When the implant is forced into the broached portion of the intramedullary canal, the tendency of the restricted bone cement to flow down the canal is prevented by the fins or flanges of the plug cooperating with the walls of the  
5 canal.

A problem associated with the known plugs is that the fins or flanges do not always cooperate sufficiently sealingly or blockingly with the bone canal. This is largely caused by the fact that the bone canal as defined by the cortical bone has a cross-section that varies along its longitudinal axis. In  
10 particular, the cross-section is of substantially elliptical or oval shape at the onset of the canal and axially inwardly becomes more circularly shaped at a midportion. Further inwardly, the cross-section becomes substantially oval or elliptically shaped again, having an orientation that is rotated around the axis of the canal to a position wherein it is substantially perpendicular to the  
15 orientation of the first section. In addition, for each person, the size of the bone and therewith the cross-section and axial dimension of the bone canal varies.

During implantation, the plug has to be placed sealingly at a predetermined location within the bone canal, e.g. about 1.5 cm axially inward from the preferred location of the lower tip of the anchoring portion after  
20 insertion.

Due to the varying shape of the bone canal it has proven difficult to provide a plug that can be used to reliably plug the canal at any axial location. Depending on the circumstances, a good chance exists that cement can either pass the flanges of the plug or that the plug can escape inwardly into the canal  
25 upon insertion of the anchoring portion.

In the prior art, to overcome the problem of insufficient cooperation of the flanges with the bone canal, it has been suggested to provide the plug with a plurality of flanges, each having varying radial dimension e.g. by tapering a central body from which disk-like fins extend as described in  
30 US 5 383 932 or by providing a central body with disk-like fins of increasing

size extend as described in US 5 879 403. This solution however has the disadvantage that the chance exists that one or more flange will not engage the wall sufficiently strong enough, which may cause the plug to escape into the canal. In addition, in the prior art it has been proposed to provide the 5 flanges with radial cuts, such that insertion of such flanges into unexpectedly narrow portions of the bone canal is facilitated. An example thereof is shown in e.g. US 4 245 359 or US 5 766 178.

However, this increases the chance of cement passing through the flanges of the plug as the top surfaces of the flanges are open.

10 The invention aims to provide a plug in which the above problem is alleviated. According to the invention, providing a plug for insertion into a bone canal is provided, comprising an elongate central body of substantially constant cross section carrying at least four radially extending flanges of substantially equal shape and size, the flanges forming disk-like structures 15 and being axially spaced along the central axis of the body, such that the extend in substantially parallel planes, the plug being made of a copolymer of a polyalkylene glycol terephthalate and an aromatic polyester.

Surprisingly, it has been found that a copolymer of polyalkylene 20 glycol terephthalate and aromatic polyester allows for a plug configuration having a plurality of axially spaced, identical flanges, without the need for providing the flanges with a decreasing radial dimension. The at least four flanges each have equal chance of engaging the wall of the bone canal. The specific combination of configuration and material allows the flanges to cooperate both sufficiently sealingly and blockingly with the walls of the bone 25 canal, while yet being made of a biocompatible and biodegradable material. Any radial cuts in the flanges may, in use be closed due to swelling of the material in response to surrounding fluid.

To further enhance flexibility, at least one of the flanges may be provided with at least one flexing zone having reduced material thickness 30 relative to a supporting zone that surrounds the flexing zone. In particular, the

flanges may be provided with apertures, which may or may not extend axially through the flanges. Examples of apertures that do not axially extend through the flanges are closed chambers or voids, blind holes and grooves. Examples of apertures that do axially extend through the flanges are perforations, through 5 holes and slots. Due to swelling of the material, apertures extending axially through the flanges may in use may be at least partially closed, e.g. in case of an axially tapered perforation in a flange.

The flexibility of the material also allows the flanges to be provided with a closed surface, free of cuts. This reduces the chance of leakage to a 10 minimum. In particular, the flanges may be free of any apertures that in use extend through the flanges in axial direction.

Preferably, the copolymer comprises 20-90 wt.%, more preferably 50-80 wt.% of the polyalkylene glycol terephthalate, and 80-10 wt.%, more preferably 50-20 wt.% of the aromatic polyester. A preferred type of copolymers 15 according to the invention is formed by the group of block copolymers.

The polyalkylene glycol terephthalate may have a weight average molecular weight of about 150 to about 4000. Preferably, the polyalkylene glycol terephthalate has a weight average molecular weight of 200 to 1500. The aromatic polyester preferably has a weight average molecular weight of from 20 200 to 5000, more preferably from 250 to 4000. The weight average molecular weight of the copolymer preferably lies between 10,000 and 300,000, more preferably between 40,000 and 120,000.

The weight average molecular weight may suitably be determined by gel permeation chromatography (GPC). This technique, which is known per se, 25 may for instance be performed using chloroform as a solvent and polystyrene as external standard. Alternatively, a measure for the weight average molecular weight may be obtained by using viscometry (see NEN-EN-ISO 1628-1). This technique may for instance be performed at 25°C using chloroform as a solvent. Preferably, the intrinsic viscosity of the copolymer lies 30 between 0.2289 and 1.3282 dL/g, which corresponds to a weight average

molecular weight between 10,000 and 200,000. Likewise, the more preferred ranges for the weight average molecular weight measured by GPC mentioned above can also be expressed in terms of the intrinsic viscosity.

In a preferred embodiment, the polyalkylene glycol terephthalate 5 component has units of the formula -OLO-CO-Q-CO-, wherein O represents oxygen, C represents carbon, L is a divalent organic radical remaining after removal of terminal hydroxyl groups from a poly(oxyalkylene)glycol, and Q is a divalent organic radical.

Preferred polyalkylene glycol terephthalates are chosen from the group 10 of polyethylene glycol terephthalate, polypropylene glycol terephthalate, and polybutylene glycol terephthalate and copolymers thereof, such as poloxamers. A highly preferred polyalkylene glycol terephthalate is polyethylene glycol terephthalate.

The terms alkylene and polyalkylene generally refer to any isomeric 15 structure, i.e. propylene comprises both 1,2-propylene and 1,3-propylene, butylene comprises 1,2-butylene, 1,3-butylene, 2,3-butylene, 1,2-isobutylene, 1,3-isobutylene and 1,4-isobutylene (tetramethylene) and similarly for higher alkylene homologues. The polyalkylene glycol terephthalate component is preferably terminated with a dicarboxylic acid residue -CO-Q-CO-, if necessary 20 to provide a coupling to the polyester component. Group Q may be an aromatic group having the same definition as R, or may be an aliphatic group such as ethylene, propylene, butylene and the like.

The polyester component preferably has units -O-E-O-CO-R-CO-, wherein O represents oxygen, C represents carbon, E is a substituted or 25 unsubstituted alkylene or oxydialkylene radical having from 2 to 8 carbon atoms, and R is a substituted or unsubstituted divalent aromatic radical.

In a preferred embodiment, the polyester is chosen from the group of polyethylene terephthalate, polypropylene terephthalate, and polybutylene terephthalate. A highly preferred polyester is polybutylene terephthalate.

The preparation of the copolymer will now be explained by way of example for a polyethylene glycol terephthalate/polybutylene terephthalate copolymer. Based on this description, the skilled person will be able to prepare any desired copolymer within the above described class. An alternative

- 5 manner for preparing polyalkylene glycol terephthalate/polyester copolymers is disclosed in US-A-3,908,201.

A polyethylene glycol terephthalate/polybutylene terephthalate copolymer may be synthesized from a mixture of dimethyl terephthalate, butanediol (in excess), polyethylene glycol, an antioxidant and a catalyst. The  
10 mixture is placed in a reaction vessel and heated to about 180°C, and methanol is distilled as transesterification proceeds. During the  
transesterification, the ester bond with methyl is replaced with an ester bond  
with butylene and/or the polyethylene glycol. After transesterification, the  
temperature is raised slowly to about 245°C, and a vacuum (finally less than  
15 0.1 mbar) is achieved. The excess butanediol is distilled off and a prepolymer  
of butanediol terephthalate condenses with the polyethylene glycol to form a  
polyethylene/polybutylene terephthalate copolymer. A terephthalate moiety  
connects the polyethylene glycol units to the polybutylene terephthalate units  
of the copolymer and thus such a copolymer also is sometimes referred to as a  
20 polyethylene glycol terephthalate/polybutylene terephthalate copolymer  
(PEGT/PBT copolymer).

Further preferred embodiments of the invention are described in the appended claims.

The invention will be elucidated further by means of a drawing. In  
25 the drawing is:

Fig. 1 a schematical cross sectional view of a bone plug;

fig. 2 a schematic perspective view of the bone plug of fig. 1;

fig. 3 a schematical cross sectional view of a portion of a bone canal  
in which the plug is inserted;

30 fig. 4 shows a photograph of a bone plug corresponding to fig. 1;

fig. 5 shows a photograph of the bone plug of fig. 4 inserted in a bore in a block of transparent material;

fig. 6 shows a photographic top view of the block of fig. 5; and

5 fig. 7 shows a cross section of a flange having different types of flexing zones for enhancing flexibility of the flange.

The drawings are only schematic representations of an exemplary embodiment of the plug. In the drawings, identical or corresponding parts are identified with the same reference numerals.

Fig. 1 and fig. 2 show a plug 1 for insertion into a bone canal. The  
10 plug 1 comprises an elongate central body 2 of substantially constant cross section. The central body 2 carries four radially extending flanges of equal shape and size. The flanges 3 form solid, disk-like structures having a closed surface, free of cuts. The flanges 3 do not comprise any cuts and upon deformation, maintain a closed sealing surface. The flanges 3 are axially  
15 spaced along the central axis A of the body 1 and extend in substantially parallel planes P. The plug 1 is, as set out above, made of a copolymer of a polyalkylene glycol terephthalate and an aromatic polyester.

The central body 1 carries on a front portion 4 thereof a front flange  
5. The front flange 5 has, relative to the other flanges 3, a smaller radial  
20 dimension. In the drawing, the difference is indicated by  $\Delta R$ . This way, the front portion 4 of the plug 1 can be inserted more easily into a bone canal and will, upon insertion, provide a centering effect. To further facilitate insertion, the front flange 5 has a convex top surface 6. In the shown embodiment, the top surfaces 9 of the other flanges are also slightly curved or sloped in the  
25 direction of the rear end 8 of the plug during insertion. Preferably, the flanges 5, 3 have a substantially planar or rearwardly sloping bottom surface 9. In addition, the flanges 3, 5 are provided with rounded edges 10 extending from the top surfaces 6, 7 to the rear surfaces 9. This way, sealing engagement of the sidewalls of a bone canal is facilitated.

The plug 1 further comprises a blind bore 11, extending axially from a rear portion 8 of the plug towards the front portion 4. The blind bore 11 can be used to insert the tip of a tool 12 with which the plug 1 is inserted in an inserting direction 13 into a bone canal 14, as shown in fig. 3.

5 In fig. 3 it is shown how, due to the combination of the configuration and the material of the plug 1, the plug 1 can deform to cooperate both sealingly and blockingly with the sidewalls of the bone canal.

Referring to fig. 4, a photograph is shown of the bone plug 1, analogous to the drawing shown in fig. 2.

10 Fig. 5 shows a photograph of the bone plug 1 inserted into a cylindrical canal in a block B of transparent material.

Fig. 6 shows a photographic top view of the block of fig. 5.

From figs. 5 and 6, it is clear that the flanges sealingly engage the walls of the bore in the block B. In fig. 5 it is shown that the front flange 5, due 15 to its smaller radial dimension, shows a lower degree of backward flexing than the other flanges 3. The top view of fig. 6 shows the rear flange 3 having a closed surface, free of cuts.

As shown in fig. 7, to further enhance flexibility, a flange 3 can be provided with several flexing zones Z having reduced material thickness t2 20 relative to the thickness t1 of the material at supporting zones S that surround the flexing zones Z. In particular, the flange 3 is provided with apertures that extend axially along axis A' through the flange 3 from the top surface 6 to the bottom surface 9, namely a straight trough hole 21 and an axially tapered perforation 22 which may close upon swelling of the material of the supporting 25 zone S. In these cases, the thickness t2 of the material at the flexing zone Z is locally reduced to zero. Apertures that do not axially extend through the flange are also shown as a void 23 and a blind hole 24.

It shall be clear to the skilled man that the plug is not limited to the preferred embodiments described herein and that many variations are possible 30 within the scope of the appended claims. For example, it is possible to provide

the flanges with radial cuts. Such cuts may in use be closed due to the swellable behaviour of the copolymer of polyalkylene glycol tetraphthalate and aromatic polyester.

- In particular, it should be noted that the plugs can be used in bone  
5 canals in various bones of the body, e.g. in an upper arm bone canal for a shoulder prosthesis or a lower leg bone canal for a knee prosthesis.

Claims

1. A plug for insertion into a bone canal, comprising an elongate central body of substantially constant cross section carrying at least four radially extending flanges of substantially equal shape and size, the flanges being axially spaced along the central axis of the body, such that they extend in substantially parallel planes, the plug being made of a copolymer of a polyalkylene glycol terephthalate and an aromatic polyester.  
5
2. A plug according to claim 1, wherein at least one of the flanges is provided with at least one flexing zone having reduced material thickness relative to a supporting zone that surrounds the flexing zone.
- 10 3. A plug according to claim 1 or 2, wherein the flanges form solid, disk-like structures having a closed surface.
4. A plug according to any of claims 1-3, wherein the central body carries at least five radially extending flanges, and wherein a front flange carried on a front portion of the central body is, relative to the other flanges, 15 provided with a smaller radial dimension.
5. A plug according to claim 3 or 4, wherein at least the front flange has a convexely curved top surface.
6. A plug according to any of the preceding claims, wherein the flanges comprise a substantially planar bottom surface.
- 20 7. A plug according to any of the preceding claims, wherein the flanges are provided with rounded edges.
8. A plug according to any of the preceding claims, wherein the central body is provided with a blind bore extending axially from a rear portion of the central body.
- 25 9. A plug according to any of the preceding claims, wherein the rear portion of the central body radially extends as the back surface of a flange.

10. A plug according to any of the preceding claims, wherein the polyalkylene glycol terephthalate is polyethylene glycol terephthalate and the aromatic ester is polybutylene terephthalate.
11. A plug according to claim 10, wherein the copolymer comprises from 5 20-90, preferably from 50-80 wt.% of the polyethylene glycol terephthalate, based on the weight of the copolymer.

1/5

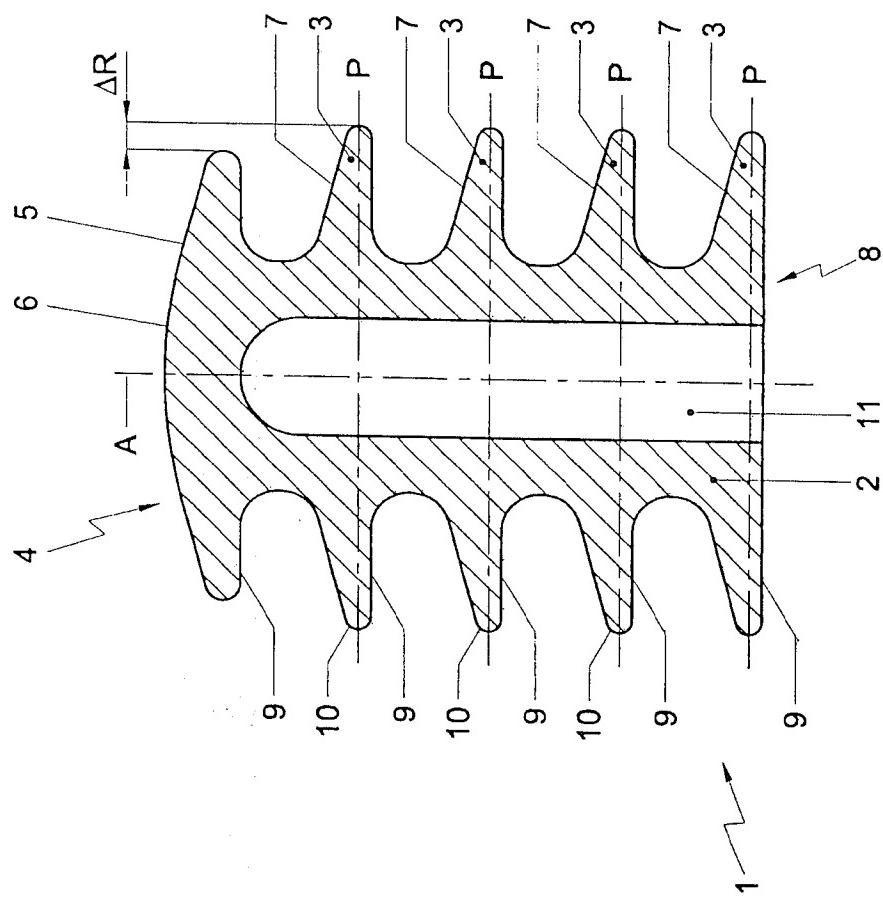


Fig. 1

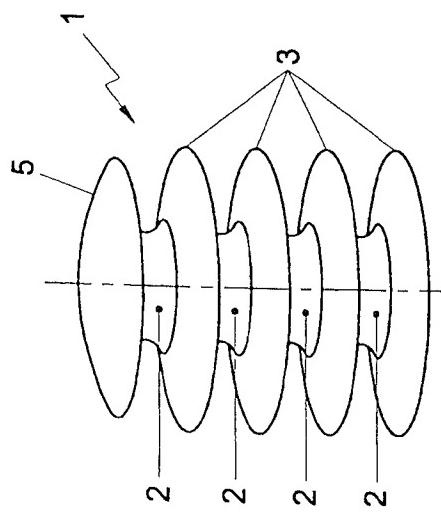


Fig. 2

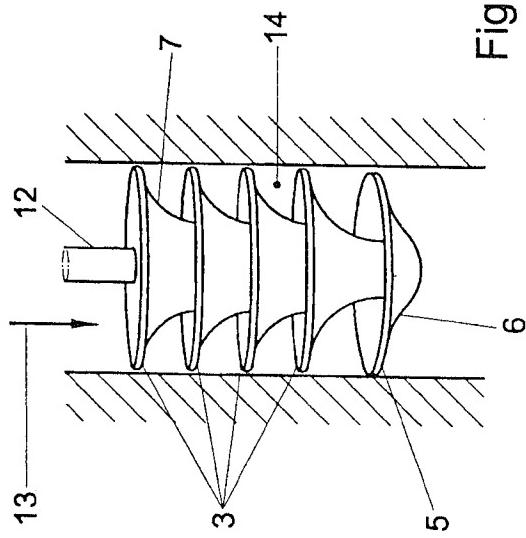


Fig. 3

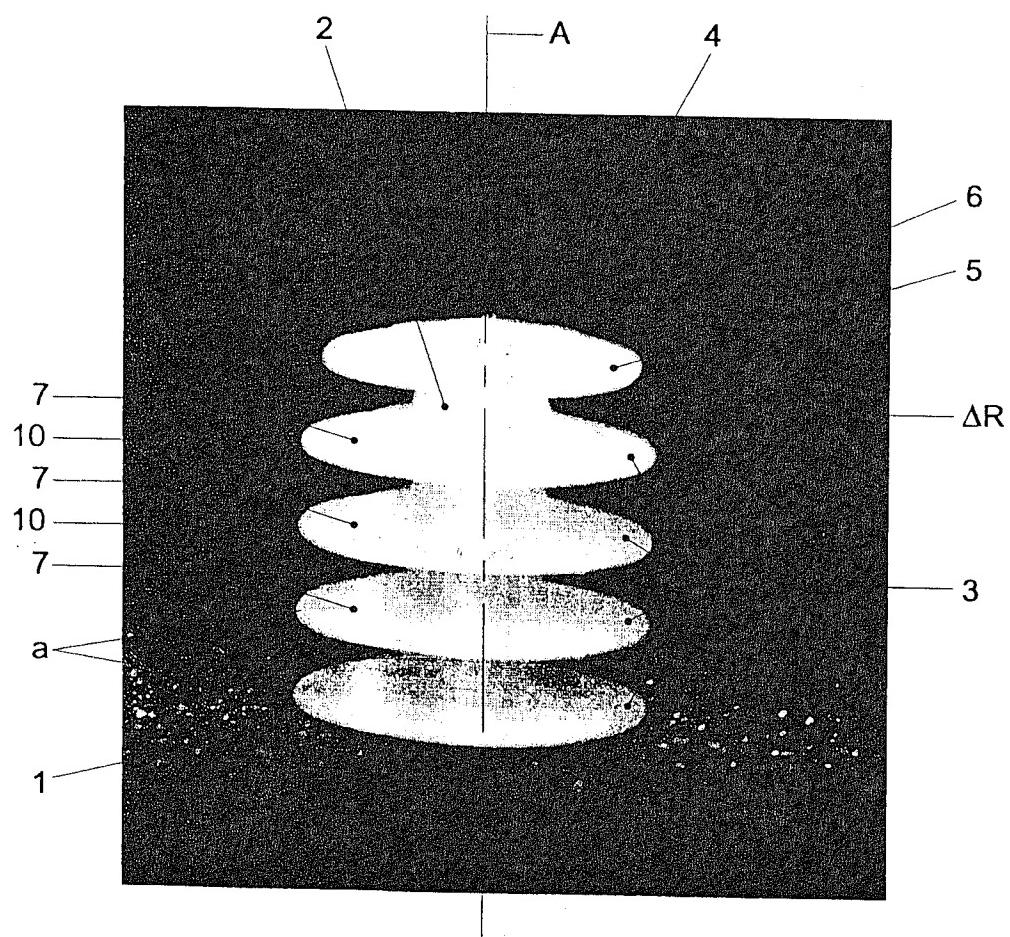


Fig. 4

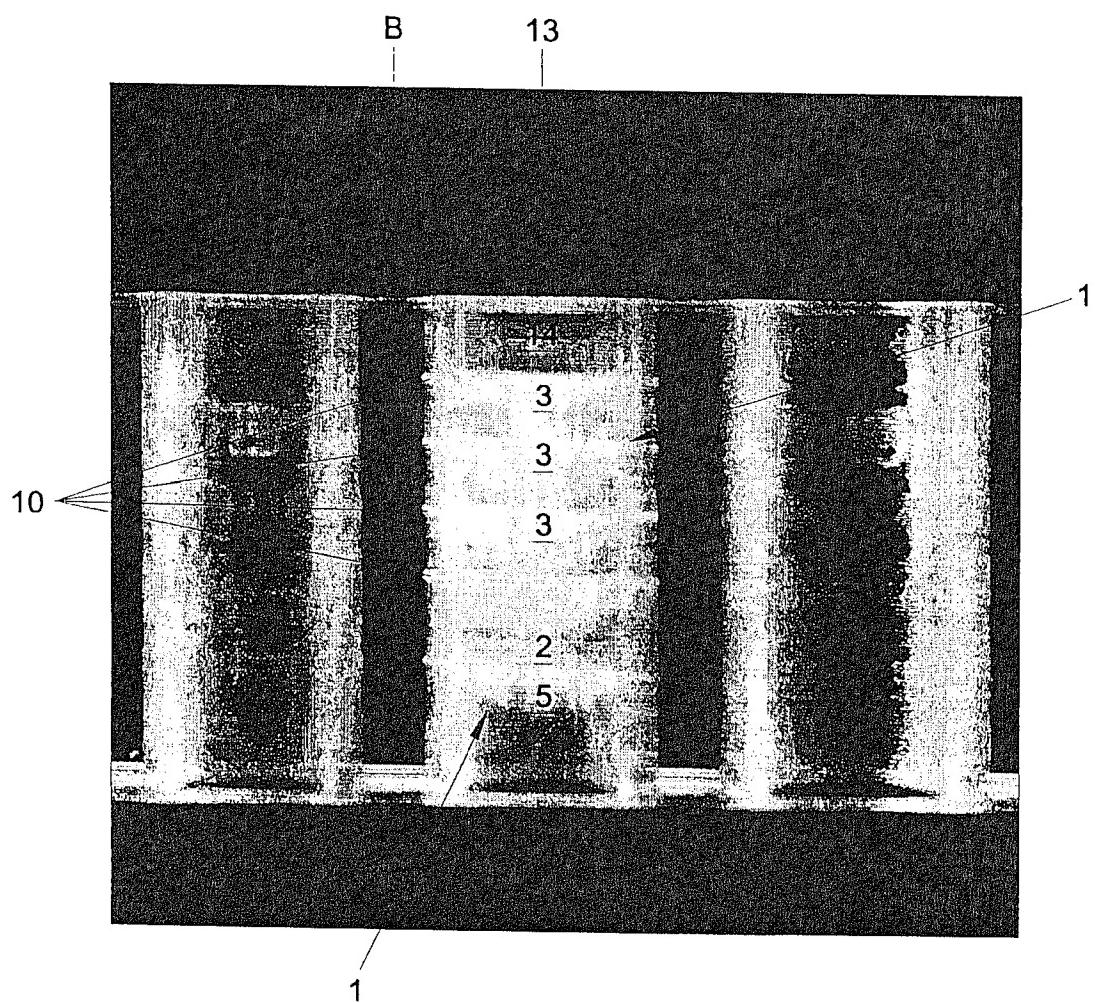


Fig. 5

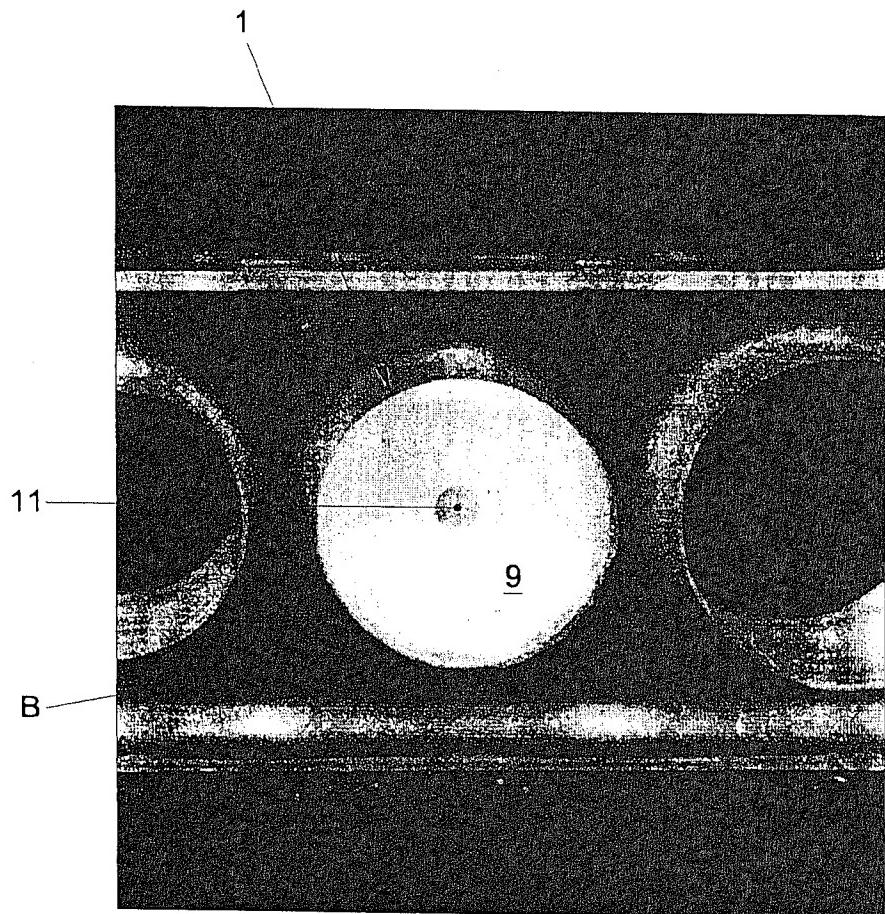


Fig. 6

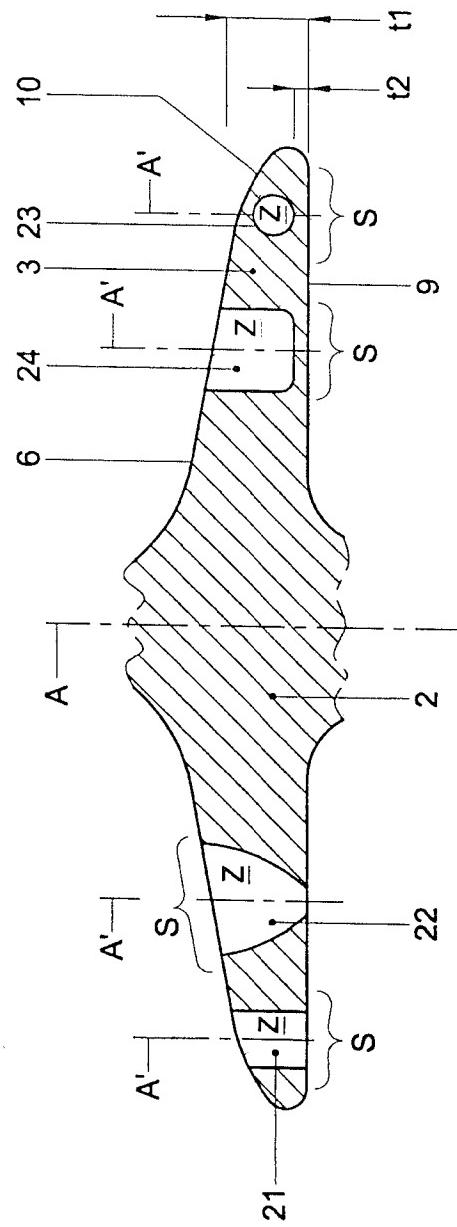


Fig. 7

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/NL 01/00134

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61F2/30 A61L31/06

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 763 500 A (LANDANGER CAMUS) 27 November 1998 (1998-11-27) the whole document ---	1,3-5,8
A	US 5 383 932 A (WILSON) 24 January 1995 (1995-01-24) cited in the application the whole document ---	1,3,8
A	US 5 766 178 A (MICHIELLI) 16 June 1998 (1998-06-16) cited in the application the whole document ---	1,4-7
A	US 4 245 359 A (STUHMER) 20 January 1981 (1981-01-20) cited in the application the whole document ---	1,4,6,9
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*8\* document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 July 2001	25/07/2001
Name and mailing address of the ISA  European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016	Authorized officer  Klein, C

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/NL 01/00134

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 25940 A (SUNMED) 24 July 1997 (1997-07-24) the whole document ---	1-3,6,8
A	US 5 263 991 A (WILEY) 23 November 1993 (1993-11-23) column 4, line 54 -column 5, line 14; figures 2,3,5 ---	1
A	EP 1 027 897 A (ISOTIS) 16 August 2000 (2000-08-16) the whole document ---	1,10,11
A	EP 1 038 538 A (ISOTIS) 27 September 2000 (2000-09-27) the whole document ---	1,10,11
A	US 5 879 403 A (OSTIGUY) 9 March 1999 (1999-03-09) cited in the application ---	
A	FR 2 758 977 A (SRIAHI) 7 August 1998 (1998-08-07) ---	
A	US 3 908 201 A (JONES) 30 September 1975 (1975-09-30) cited in the application ---	
A	FR 2 776 917 A (GROUPE LEPINE) 8 October 1999 (1999-10-08) -----	

**INTERNATIONAL SEARCH REPORT**

International Application No PCT/NL 01/00134
---

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
FR 2763500	A	27-11-1998	NONE		
US 5383932	A	24-01-1995	AU 683642 B		20-11-1997
			AU 6072894 A		03-11-1994
			CA 2122066 A		28-10-1994
			DE 69417098 D		22-04-1999
			DE 69417098 T		19-08-1999
			DK 626155 T		11-10-1999
			EP 0626155 A		30-11-1994
			ES 2129582 T		16-06-1999
			JP 7047093 A		21-02-1995
US 5766178	A	16-06-1998	NONE		
US 4245359	A	20-01-1981	CH 625119 A		15-09-1981
			AT 373142 B		27-12-1983
			AT 37979 A		15-05-1983
			DE 2814037 A		04-10-1979
			GB 2017503 A,B		10-10-1979
WO 9725940	A	24-07-1997	US 5662657 A		02-09-1997
			CA 2215723 A		24-07-1997
			EP 0888095 A		07-01-1999
			JP 11502453 T		02-03-1999
US 5263991	A	23-11-1993	WO 9515129 A		08-06-1995
			US 5376120 A		27-12-1994
			AU 5983494 A		19-06-1995
			EP 0731674 A		18-09-1996
			JP 9508816 T		09-09-1997
EP 1027897	A	16-08-2000	AU 1499000 A		17-08-2000
			JP 2000237298 A		05-09-2000
EP 1038538	A	27-09-2000	AU 3464900 A		09-10-2000
			WO 0056374 A		28-09-2000
US 5879403	A	09-03-1999	GB 2323535 A,B		30-09-1998
			GB 2323536 A,B		30-09-1998
			JP 11000343 A		06-01-1999
			US 5997580 A		07-12-1999
FR 2758977	A	07-08-1998	NONE		
US 3908201	A	30-09-1975	GB 1425577 A		18-02-1976
			AU 5692773 A		19-12-1974
			DE 2332248 A		17-01-1974
			FR 2190399 A		01-02-1974
			IL 42504 A		30-09-1976
			IT 990717 B		10-07-1975
			JP 50106497 A		21-08-1975
			US 4042978 A		23-08-1977
FR 2776917	A	08-10-1999	NONE		